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LETHAL TIME AS A MEASURE OF VENOM POTENCY

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Running Title: Lethal Time and Venom Potency

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ABSTRACT

Lethal time seems to have limited use as a measure of venom potency.

LETHAL TIME AS A MEASURE OF VENOM POTENCY*

Venoms from the scorpion Centruroides sculpturatus Ewing and gila monster Heloderma suspectum Cope were used in studying lethal time as an index of venom lethality to mice.

MATERIALS AND METHODS

Raw venom samples were prepared as described previously (1).

LD_{50}'s were calculated by the Thompson and Weil method (2). The assay animals were NAMRU albino swiss mice. These animals had no food for 24 hours and no water for two hours before weighing. After weighing, they were injected I.P. Food and water were made available two hours after injection. Observations after injection were for 24 hours.

The statistical test employed was the nonparametric Mann-Whitney U Test (3). Each comparison made assumed a two tailed test and a significance level of 0.05. This test compared two independent samples and the only assumption made is that the samples are random.

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* Supported by U.S. Army grant DA 49-092-ARO-88, Item 2.

RESULTS

C. sculpturatus and H. suspectum venom LD_{50} in mice were 1.5 (1.1-1.9) mg and 3.0 (2.1-4.2) mg of venom per Kg of mouse, respectively. There was a significant difference in the lethal times for the two venoms (Table 1). At the 2 LD_{50} dosage level C. sculpturatus venom evoked lethal times within a relatively narrow range. This relationship was not apparent with H. suspectum venom. Thus, further tests with H suspectum venom at increased dosage levels did not seem practical. Responses to C. sculpturatus venom in mice at increased dosage levels were studied (Table 2). When these dosage levels were plotted against mean lethal time a linear relationship could be approximated (Figure 1).

DISCUSSION

The response of a test animal varies with the type of venom injected. C. sculpturatus venom elicits convulsions and heavy salivation in the recipient. H. suspectum venom causes hypoactivity accompanied by respiratory and cardiac failure in the recipient. These venoms, however, have approximately the same LD_{50} when injections are made I.P. If lethal time is a measure of lethality per se the two venoms should have the bulk of their lethal time about equal. This was not observed. Increased dosages of scorpion venom decreased the lethal times in mice. Thus, lethal time might indicate the amount

of venom injected.

ACKNOWLEDGMENTS

I thank Bob D. Johnson for his assistance and suggestions during this work.

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1. Johnson, Bob D., et al. 1966. A Quantitative Protozoan Bioassay Method for Determining Venom Potencies. Toxicon 3:297.
2. Thompson, W. R. and Weil, C. S. 1952. On the Construction of Tables for Moving Average Interpolation. Biometrics 8:249.
3. Siegel, S. 1956. In case of two independent samples 95-158. In Nonparametric Statistics for Behavioral Sciences. Mc-Graw-Hill, New York.

Table 1

Lethal times for C. sculpturatus and H. suspectum venoms in mice at 2 LD_{50} doses*

C. sculpturatus		H. suspectum	
Lethal time (minutes)	Rank value	Lethal time (minutes)	Rank value
80	20	840	37
79	19	730	36
57	16	709	35
45	15	698	34
43	13	606	33
39	12	599	32
34	10	565	31
31	9	326	30
30	8	325	29
30	7	323	28
28	6	322	27
28	5	315	26
26	4	279	25
23	3	135	24
21	2	123	23
13	1	122	22
	$R_1 = 150$	100	21
		76	18
		72	17
		43	12
		36	11
			$R_2 = 528$

* ($X = .05$; $u = 322$; $Z = 4.7$; probability of 0.0003, thus a highly significant difference.

Table 2

Lethal times for C. sculpturatus venom

in mice at 2, 3, 4, and 5 LD_{50} doses*

Lethal times at 2 LD_{50} dosage	Lethal times at 3 LD_{50} dosage	Lethal times at 4 LD_{50} dosage	Lethal times at 5 LD_{50} dosage
45	30	30	26
43	27	28	24
39	27	27	23
34	27	25	20
33	26	23	20
32	26	21	18
30	24	19	18
28	22	19	18
28	16	19	10
mean 33.9	25.0	23.4	19.7

* Lethal times are in minutes.

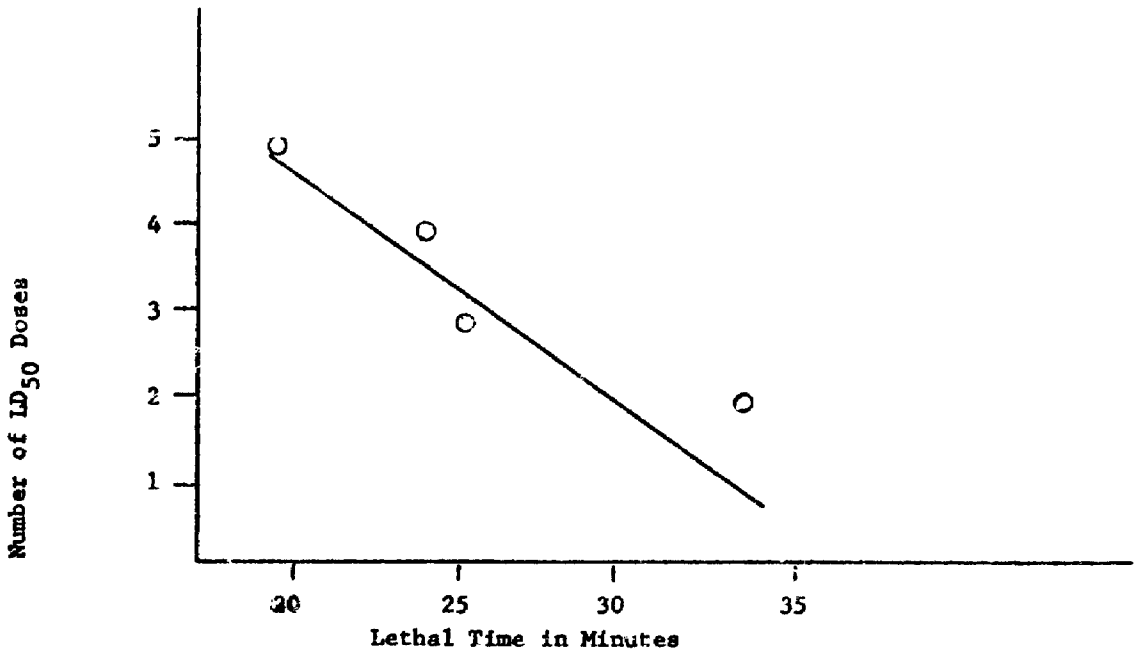

Figure 1. C. sculpturatus venom mean lethal times for mice (9 per level) as compared to dosage level.

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INFORMATION

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